REMARKS:

Claims 1-12 and 15-19 are in the case and presented for consideration.

Claims 1 and 12 have been amended.

Rejections Under 35 U.S.C. §112

The Examiner has rejected claims 1-12 and 15-19 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement, indicating that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention. Office Action at pp. 2, 3.

Specifically, the Examiner asserts that the limitation "without any passage through any other gas flow path or passage in the first porous substrate" is not supported by the disclosure as originally filed and notes that the reactant gas must pass through the passage in the first porous substrate because the substrate is porous and the "porous substrate is the only gas flow path in the first electrode member." *Id.* at p. 3

Additionally, the Examiner has rejected claims 1-12 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, asserting that it is unclear how the reactant gas does not pass through the porous substrate when the "substrate is porous" and the "porous substrate is the only gas flow path in the first electrode member." *Id.*

In response, Applicant has amended claims 1 and 12 to clarify that the first electrode member consists of a first porous substrate that has a plurality of minute holes dispersed randomly therein; that the porous substrate has a sufficient gas flow property; and that the plurality of minute holes arranges for a flow of the fuel gas or air in a vertical

direction and in a horizontal direction locally, and arranges for a flow of the fuel gas or air toward the outlet opening from the inlet. Support for this amendment may be found at paragraphs [0014], [0038], [0062], [0063].

Rejections Under 35 U.S.C. §103

Claims 1-8,11-12,17,19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,476,196 to Poeppel et al. (hereinafter "Poeppel et al.") in view of U.S. Patent No. 5,330,859 to McPheeters (hereinafter "McPheeters"). *Id.* at pp. 3, 4.

Applicant respectfully submits that, as discussed in detail below, the claimed invention is distinguished over Poeppel et al. in view of McPheeters et al. because the cited the references use open passages, rather than pores, for the passage of fuel cell gasses. The porosity of the electrode in the presently-claimed invention is for making the electrode member ***itself*** function as a gas flow passage. In contrast, the porosity of the electrode taught in the cited references is only to provide better conditions for the electrochemical reaction. Therefore, the meaning of porosity in the presently-claimed invention differs from the meaning of porosity in cited references.

The Examiner asserts that Poeppel et al. discloses at 8:48-51 that the electrodes are porous to the degree required to allow the fuel and oxidant gases to combine at the electrolyte. *Id* at p. 7.

However, it is important to note that while it is indicated at 8:48-51 that "[t]he anode and cathode in the electrolyte walls 45 are porous to the degree required to allow the fuel and oxidant gases confined on the opposite sides thereof to electrochemically combine," it is ***not*** indicated that fuel gas and oxidant gas combine with an electrolyte.

This passage from Poeppel et al. discloses that an anode and a cathode are made porous to the extent that the electrochemical reactions below may occur in the cathode and anode, respectively.

(1) Cathode: $\frac{1}{2}0_2 + 2e^- \text{ ----> } 0^{2-}$

(2) Anode: $H_2 + 0^{2-} \text{ —> } H_20 + 2e^-$

That is, the porosity of the electrode taught by Poeppel et al. is required in order to provide better conditions for the electrochemical reaction which occurs in the electrode. This porosity is identical with the general porosity needed with regard to an electrode member which constitutes the single cell of a fuel cell.

Also, if the gas flow property of an electrode member is sufficiently ensured by the porosity in order to provide better conditions for the electrochemical reaction which occurs in the electrode, the gas flow property ought to be ensured by the electrode member ***itself***. Further, if the gas flow property is ensured by the electrode member itself, it would not be necessary to provide the passageways in an electrode member.

In Poeppel et al., however, the passageways 13, 14 are provided in the electrode. Thus, this reference reflects a view that the gas flow property ***cannot*** sufficiently be ensured ***solely*** by the porosity of the electrode, and, hence the gas flow property is ensured by providing passageways in an electrode of Poeppel et al.

Further, Poeppel et al., at 7:56-59, discloses that "the anode material 40 has thin layer 60 between the fuel passageways 13 and the respective layer of the electrolyte 44 and interconnect 47." Furthermore, it is indicated that thin layer 60 is an anode layer (7:64). Therefore, it is easily understood that anode thin layer 60 is between passageways 13 and electrolyte 44.

As mentioned above, a person skilled in the art can easily understand that the gas

flowing through passageways 13 contacts on the surface of anode thin layer 60 and the gas diffuses in anode thin layer 60. That is, in Poeppel et al., the gas flow property is ensured by providing passageways in an electrode, and diffusion of the gas in thin anode layer 60 is ensured by making a short distance between passageways 13 and electrolyte 44. From this, the porosity of the electrode of Poeppel et al. is not provided because it has a sufficient gas flow property. Rather, its porosity is provided in order to provide better conditions for the electrochemical reaction which takes place in the electrode.

In Poeppel et al., the electrode does not have a sufficient gas flow property. And it becomes more difficult to diffuse gas by pressure drop as an electrode layer is thickened. Therefore the electrode (anode thin layer 60) which should be diffused gas is made thin, and diffusion of the gas is ensured.

Thus, in Poeppel et al., since the gas flow property of an electrode member is not securable ***solely*** by the porosity of the electrode, a person skilled in the art would understand that the gas flow property is ensured by providing the passageways in an electrode. Therefore, Applicant respectfully disagrees with the Examiner's finding that Poeppel et al. "does not disclose that the passageways are necessary to secure gas flow." *Id.* at p. 11.

The points raised above with respect to Poeppel et al. apply with equal force to McPheeters et al.

First, since there is no reference to the porosity of an electrode in McPheeters et. al., a person of ordinary skill in the art would understand that the porosity of the electrode is the general porosity of the single cell of a fuel cell, as is required in connection with an electrode, namely it is that porosity required in order to provide better conditions for the electrochemical reaction which occurs in the electrode.

Next, it is described in McPheeters et al. that anode electrode 12 and cathode electrode 14 are both thin films. 3:18. Also, gas is flowed through defined gas channels 24 and 28 and is supplied to the surface of an electrode. That is, the gas channel in McPheeters et al. corresponds to the passageways in Poeppel et al., and the electrode in McPheeters et al. corresponds to the thin layers 60, 62 in Poeppel et al. Therefore, in McPheeters et al., the gas is supplied to the electrode in almost the same manner as the gas is supplied to the electrode in Poeppel et al.

Thus, in McPheeters et al. and Poeppel et al., the meaning of "porous" in connection with an electrode is the same and the manner of gas supply to an electrode is almost the same. Consequently, there is no reason to combine Poeppel et al. and McPheeters et al.

The presently-claimed invention makes it possible to provide sufficient gas flow by the electrode member itself, which constitutes a single cell, to overcome the need for passageways as in Poeppel et al., to simplify the structure of a single cell, and to improve its strength. Thereby, the size of the single cell can be increased and the power generation characteristic can be enhanced. *See* paragraph [0012] of the published application.

Thus, a single cell may be manufactured according to the presently-claimed invention much more easily as compared with the prior art, since it is not necessary to provide the passageways required in Poeppel et al.

Therefore, Applicant respectfully submits that the presently-claimed invention is not anticipated by Poeppel et al. in view of McPheeters et al.

Conclusion

Accordingly, Applicant believes that all the claims are now in condition for allowance and favorable action is respectfully requested. Should there be any issues that have not been addressed to the Examiner's satisfaction, Applicant invites the Examiner to contact the undersigned attorney.

If any fees other than those submitted herewith are due in connection with this response, please charge such fees to Deposit Account No. 14-1431.

Respectfully submitted,

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